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SPACE GATEWAY SUPPORT (SGS) **SGS-26 43 00.00 99 (April 2006)**

Preparing Activity: SGS-DE **Superseding SGS-16289J (February 2005)**

SGS GUIDE SPECIFICATIONS

References are NOT in Agreement with UMRL dated 01 April 2006

Revised throughout - changes not indicated by CHG tags
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04/06

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SECTION 26 43 00.00 99

TRANSIENT VOLTAGE SUPPRESSION
04/06

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NOTE: This guide specification covers the requirements for high-energy transient voltage surge suppressors.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.
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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this section to the extent referenced:

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C62.11	(1999) Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits
IEEE C62.41	(1991) Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits
IEEE C62.45	(1992) Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA LS 1	(1992) Low Voltage Surge Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 20	(1999) Installation of Centrifugal Fire Pumps
NFPA 70	(2002) National Electrical Code
NFPA 75	(2003) Standard for the Protection of Information Technology Equipment
NFPA 780	(2000) Installation of Lightning Protection Systems

UNDERWRITERS LABORATORIES (UL)

UL 1449	(2003) Transient Voltage Surge Suppressors

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident

Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy, Air Force, and NASA projects.

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The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Transient Voltage Surge Suppressor

SD-07 Certificates

10 Year Warranty

1.3 DESCRIPTION

These specifications describe the electrical and mechanical requirements for a high-energy Transient Voltage Surge Suppressor. The specified surge protective device shall provide effective high-energy surge diversion for application in ANSI/IEEE C62.41-1991 Location Category C3 environments. Testing per ANSI/IEEE C62.45-1992 using ANSI/IEEE C62.41-1991 Catagory 3 waveforms and amplitudes. UL 1449 second edition listed. The specified surge protective device shall provide:

a. 200,000 amps, per phase, of surge protection
b. Peak surge current ratings must be independently tested and verified
c. All mode protection, L-N, L-G, L-L, N-G
d. Each MOV protected from over-current, thermal overload and monitored individually
e. Self-diagnostics with comprehensive LED bar graph on front panel showing protection status of each phase and neutral-ground
f. Audible fault alarm with silence switch
g. Event counter with date and time of last event
h. Remote alarm relay contacts (surge protected), Form C
i. Low impedance installation cable provided by manufacturer
j. Ten year warrenty on entire system
k. Lifetime warrenty on field replacable internally fused protection modules

1.4 STANDARDS

The specified suppressor shall be designed, manufactured, tested and installed in compliance with:

American National Standards Institute and Institute of Electrical and Electronic Engineers (ANSI/IEEE C62.11, ANSI/IEEE C62.41 and ANSI/

IEEE C62.45)

National Electrical Manufacturer Association (NEMA LS 1)

National Fire Protection Association (NFPA 20, NFPA 70, NFPA 75 AND NFPA 780

Underwriters Laboratories (UL 1449, second edition) listed

The system individual units shall be UL listed under UL 1449 Second Edition for Transient Voltage Surge Suppressor (TVSS) and the surge ratings shall be permanently affixed to the TVSS.

1.5 ENTRANCE PANEL EQUIPMENT ELECTRICAL REQUIREMENTS

1.5.1 Environment Requirements

1. Operating temperature range shall be -40 to +70 degrees C(-40 to +160 degrees F).

2. Storage temperature range shall be -40 to +85 degrees C.

3. Operation shall be reliable in an environment with 0% to 95% non-condensing relative humidity.

4. The system shall be capable of operation up to an altitude of 13,000 feet above sea level.

5. Maximum continuous operating voltage shall be no less than 125% and no greater than 150% of the nomimal rated line voltage.

6. The power frequency range shall be at 47 to 440 Hertz.

1.5.2 Electrical Requirements

1. The maximum surge current capacity per phase of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least: 1 Event at 200kA. The surge life(8/20us) shall be at least 10,000 occurences @ 15kA. The transient suppression capability shall be bidirectional and suppress both positive and negative impulses.

2. The suppressor shall be capable of interrupting a 200kA, short circuit current delivered from the AC power line. The interrupt capability mist be confirmed and documented by a recognized independant testing laboratory.

3. The suppressor shall be designed so at to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed as shown in the installation notes for best performance.

4. Equipment shall be as manufactured by MCG Surge Protection; Model: 202XT-Family or approved equal with supporting test data.

PART 2 PRODUCTS

2.1 ENTRANCE PANEL PROTECTION SYSTEM COMPONENTS

2.1.1 Protection Modules

The suppressor shall be constructed using field replaceable protection modules. The suppressor shall have multiple surge paths per phase. Each surge path shall be individually over current fused, thermal sensored cut-off and monitored 40mm Metal Oxide Varistors(MOV's), including neutral to ground protection mode. Each module will provide five times(5X) redundant protection, with one module per each phase and five fused per module. The status of each module shall be locally monitored with a green LED that becomes red in fault condition. The transient Ipeak rating of the fuse shall be coordinated with the Ipeak handling capability of the MOV so that the surge path capability is not limited by the series fusing. In addition, each MOV shall incorporate a thermal disconnect means to remove a shorted MOV safely from the protection system.

2.1.2 Self-Diagnostics

Red and green solid-state LED indicators shall be provided on the hinged front cover to indicated protection status. An illuminated green LED indicates power and protection is present at each phase, and illuminated red LED shall indicate protection reduced and/or when protection is lost. In addition to front panel LED's a required comprehensive Bar Graph indicating status of each phase and the neutral to ground module to provide power and fault indications in the event of even the loss of a single fuse or MOV. Also provided is an event count with time and date of last event. Relay operation shall be in a fail-safe operating mode i.e., continuously energized so that power failure, reduced protection, or a break in the remote monitoring line will cause a fault indication at the remote monitor. Neon indicators are not permitted.

2.1.3 Remote Alarm Capability

Relay alarm contacts shall be provided for remote alarm monitoring capability of unit status. Form C normally open and normally closed contacts shall be provided with voltage and current limiting protection.

2.1.4 Audible Alarm

The specified system shall be equipped with an audible alarm, which shall be activated when any one or more of the modules has a reduced protection condition. A mute option shall be provided for the audible alarm.

2.1.5 NEMA 4 Enclosure

14 guage steel

PART 3 EXECUTION

3.1 INSTALLATION AND MAINTENANCE

The unit shall be installed per manufacturer's instruction and per NEC.

Units shall be installed as close as possible to the panel board to which it is connected, using low impedance cabling provided by the manufacturer.

Detailed installation/maintenance instructions shall be provided.

Replaceable fused protection modules are required. Internal construction should facilitate rapid repair.

3.2 10 YEAR WARRANTY

Manufacturer to provide 10-year warranty to cover repair or replacement with a new device. Manufacturer to provide no cost replacement of fused protection modules for the life of the suppressor.

-- End of Section --